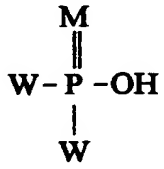
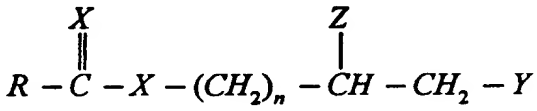
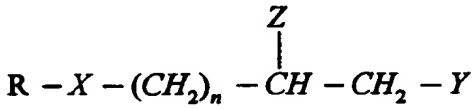
Claims:

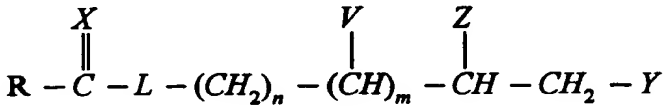
1. A composition, comprising a compound of the following formula:

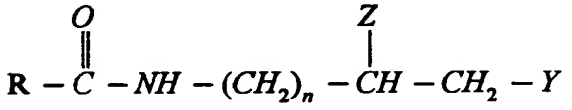


wherein M is O or S, each W is independently selected from one of the following structures:









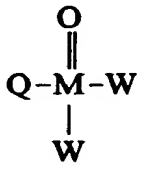
wherein Y is O or S; R is unsubstituted or substituted, saturated or unsaturated, straight or branched-chain alkyl, or $((CH_2)_pO)_q(CH_2)_pT$ where q is an integer from 1 to about 900 and where each p is independently an integer from 2 to about 10 and T is OH, or $O(CH_2)_bCH_3$ where b is an integer from 0 to about 10; each V is independently OH, SH, H, NH_2, halogen, OPO_3H_2, or OSO_3H; n is an integer from 0 to about 10; m is an integer from 0 to about 10; Z is OH, SH, NH_2, halogen, OPO_3H_2, H, $O(CH_2)_bCH_3$ where b=0 to about 2, or SO_3H; L is independently O, S, or CH_2 and X is independently O or S; or a salt thereof.

2. The composition according to claim 1, wherein R is an alkyl having between about 5 and about 24 carbon atoms, and mixtures thereof.

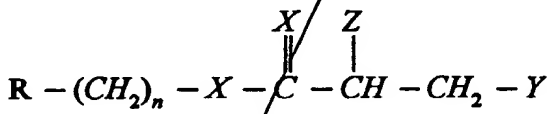
3. The composition according to claim 1, wherein R is an alkyl having 24 carbon atoms, wherein 1 or 2 of the carbon-carbon bonds are unsaturated, and mixtures thereof.

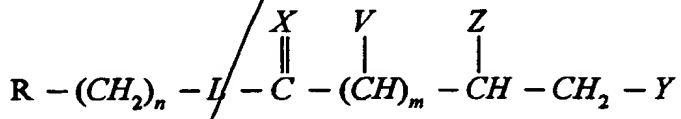
4. A composition, comprising: Bis(3-*O*-oleyl-2-*O*-methyl-*rac*-glyceryl) thiophosphate, or a salt thereof.

5. A composition, comprising a compound of the following formula:



wherein each W is independently SH, OH, $OCH_2CH(NH_2)CO_2H$, $OCHCH_3CH(NH_2)CO_2H$, OPO_3H_2, $OPO_2HOPO_3H_2$ or Q, wherein when one W is Q, the other W is OH, and wherein Q is one of the following structures:





wherein Y is O or S; R is unsubstituted or substituted, saturated or unsaturated, straight or branched-chain alkyl, or $((CH_2)_pO)_q(CH_2)_pT$ where q is an integer from 1 to about 900 and where each p is independently an integer from 2 to about 10 and T is OH, or $O(CH_2)_bCH_3$ where b is an integer from 0 to about 10; each V is independently OH, SH, H, NH_2, halogen, OPO_3H_2, or OSO_3H; n is an integer from 0 to about 10; m is an integer from 0 to about 10; Z is OH, SH, NH_2, halogen, OPO_3H_2, H, $O(CH_2)_bCH_3$ where b=0 to about 2, or SO_3H; L is independently O, S, or CH_2; X is independently O or S; and M is P or S, where when M is S, one W is (=O) and the other

W is SH, OH, $OCH_2CH(NH_2)CO_2H$, $OCHCH_2CH(NH_2)CO_2H$, OPO_3H_2, or $OPO_2HOPO_3H_2$; r a salt thereof.

6. A composition comprising a compound selected from the group consisting of reverse ester-LPA, reverse thioester-LPA and a salt of either compound.

7. A composition comprising 3 Oleyl 1-thiophosphoryl-2-O-methyl-*rac*-glycerate, or a salt thereof.

8. A method of treating apoptosis, or preserving or restoring function in a cell, tissue or organ comprising administering *in vivo* a therapeutically effective amount of a pharmaceutically acceptable composition of claims ~~1, 2, 3, 4, 5, 6, or 7.~~ claim 1

9. The composition of ~~Claims 1, 2, 3, 4, 5, 6, or 7~~ claim 1, wherein said composition further comprises a potentiating component.

10. The composition of claim 9, wherein said component is a polyethylene glycol.

11. The composition of Claim 9, wherein said component is a protein.

12. The composition of Claim 9, wherein said component is a lipid membrane structure.

13. The composition according to claim 12, wherein the lipid membrane structure comprises at least one compound selected from the group consisting of a lipid, a phospholipid and a surfactant.

14. The composition according to claim 13, wherein the lipid is selected from the group consisting of phospholipids, glycolipids, steroids, bolaamphiles and a combination thereof.

15. The composition according to claim 13, wherein the surfactant is nonionic.

16. The composition according to claim 13, wherein the lipid membrane structure further comprises a tissue targeting compound.

17. The composition according to claim 16, wherein the tissue targeting compound is selected from the group consisting of an antibody, a cell surface receptor, a ligand for a cell surface receptor, a polysaccharide, a drug, a hormone, a hapten, a special lipid and a nucleic acid.

18. The composition according to claim 13, wherein the composition further comprises a component selected from the group consisting of a polypeptide, a modified polypeptide and a polymer.

19. The composition according to claim 18, wherein the polypeptide is a fatty acid binding protein.

20. The composition according to claim 18, wherein the polymer is a naturally occurring polymer and is selected from the group consisting of dextrans, hydroxyethyl starch, and polysaccharides.

21. The composition according to claim 20, wherein the polysaccharide is selected from the group consisting of trehalose, glucose, maltose, lactose, maltulose, iso-maltulose, lactulose, mono-reducing glycosides of polyhydroxy compounds selected from sugar alcohols, other straight chain polyalcohols, raffinose, stachyose, melezitose, dextran, sucrose and sugar alcohols thereof, maltitol, lactitol, iso-maltulose, palatinit, 2-D-glucopyranosyl-1(6-mannitol and their individual sugar alcohols.

22. The composition according to claim 18, wherein the polymer is synthetic and is selected from the group consisting of polyalkyl glycols, polyoxyethylated polyols, polyvinylpyrrolidone, polyhydroxyethyl methacrylate, polyvinyl alcohols, polyurethane, polytrimethylene glycol, polypropylene glycol, polyacrylic acid, polyethyloxazoline, polyacrylamide, polyphosphazene, poly(lactic acid), poly(glycolic acid), polyamino acids and polymeric mixtures thereof.

23. The composition according to claim 11, wherein the protein comprises at least one compound selected from the group consisting of a lipid binding protein and a lipid carrier protein.

24. The composition according to claim 11, wherein the protein is selected from the group consisting of albumin, soy and plant protein, cytochrome c, low density lipoprotein, acyl carrier protein, and alphafeto protein.

25. The composition according to claim 12, wherein the weight ratio of PEG to LPA is 1–100,000 to 1.

26. The composition according to claim 12, wherein the PEG has an average molecular weight from about 8,000 to about 40,000.

27. The composition according to claim 12, wherein the PEG has an average molecular weight of about 20,000.

28. The composition according to ~~claims 1, 2, 3, 4, 5, 6, or 7~~ claim 1, further comprising pharmaceutically acceptable excipients.

29. The composition according to ~~claims 1, 2, 3, 4, 5, 6, or 7~~ claim 1, further comprising a pharmaceutically effective agent.

30. The composition according to claim 29, wherein the pharmaceutically effective agent is selected from the group consisting of a drug, an antibiotic, a wound healing agent and an antioxidant.

31. The composition according to claim 30, wherein the drug is selected from the group consisting of antipyretic and anti-inflammatory, analgesics, antiarthritics, antispasmodics, antidepressants, antipsychotics, tranquilizers, antianxiety drugs, narcotic antagonists, antiparkinsonism agents, cholinergic antagonists, chemotherapeutic agents, immuno-suppressive

agents, antiviral agents, parasiticides, appetite suppressants, antiemetics, antihistamines, antimigraine agents, coronary vasodilators, cerebral vasodilators, peripheral vasodilators, hormonal agents, contraceptives, antithrombotic agents, diuretics, antihypertensive agents, cardiovascular drugs, opioids, and vitamins.

32. The composition according to claim 30, wherein the antibiotic is selected from the group consisting of ampicillin, tetracycline, chloramphenicol, erythromycin, amphotericin B and penicillin.

33. The composition according to claim 30, wherein the wound healing agent is selected from the group consisting of transforming growth factors, platelet-derived growth factors, epidermal growth factors and fibroblast growth factors.

34. The composition according to claim 30, wherein the antioxidant is selected from the group consisting of Vitamin_C, Vitamin_E , Vitamin A, dihydrolipoamide, flavenoids, butylated hydroxytoluene, butylated hydroxyanisole, Trolox®, propyl gallate, phenolic antioxidants, phenothiazines, desferrioxamide, HBED and CP130.

35. A method of making the composition of Claim 9, comprising the steps of:

a) forming a lipid dispersion comprising LPA;

b) providing at least one of said components; and

c) combining the products of steps a and b.

36. The method according to claim 35, wherein the lipid dispersion is formed by the steps of:

a) dissolving LPA and any other lipids in organic solvent;

b) removing the solvent to form dried lipid; and

c) dispersing the dried lipid into aqueous media by the steps of:

i) forming an even lipid dispersion; and

ii) forming an even dispersion of lipid membrane structures.

37. The method according to claim 35, further comprising the step of d) sterilizing the dispersion.

38. A composition obtained according to a method according to claim 35.

39. The method of claim 8, wherein said pharmaceutically acceptable composition further comprises a potentiating component.

40. The method of claim 39, wherein said potentiating component comprises a polyethylene glycol.

41. The method of claim 39, wherein said potentiating component comprises a protein.

42. The method of claim 39, wherein said potentiating component comprises a lipid membrane structure.

43. The method according to claim 8, comprising administering said composition to a patient suffering from a condition related to apoptosis, ischemia, traumatic injury or reperfusion damage.

44. The method according to claim 8, comprising administering said composition to a patient suffering from gastrointestinal perturbation.

45. The method according to claim 44, wherein the gastrointestinal perturbation is caused by a stimulus selected from the group consisting of viruses, chemotherapeutic agents, radiation, infectious diseases, inflammatory bowel disease, and diarrhea-causing organisms.

46. The method according to claim 45, wherein the virus is human immunodeficiency virus.

47. The method according to claim 8, wherein the method diminishes apoptosis-related problems associated with immunosuppressing viruses, chemotherapeutic agents, or radiation and immunosuppressive drugs.

48. The method according to claim 43, wherein the reperfusion damage is associated with coronary artery obstruction; stroke; cerebral infarction; spinal/head trauma and concomitant severe paralysis; frostbite; coronary angioplasty; blood vessel attachment; limb attachment; organ attachment; and kidney reperfusion.

49. A method of culturing cells comprising treating cells with an amount of the composition according to ~~claims 1, 2, 3, 4, 5, 6 or 7~~ claim 1 effective to prevent apoptosis or preserve the cells.

50. The method according to claim 49, wherein the cells are part of a tissue or organ.

51. A method of preserving an organ comprising adding an effective amount of the composition according to ~~claim 1, 2, 3, 4, 5, 6 or 7~~ claim 1 to the solution with which the organ is treated.

52. A method of organ preservation comprising administering to a donor organ at least one intravenous bolus of an effective amount of the composition according to ~~claim 1, 2, 3, 4, 5, 6, or 7.~~ claim 1

53. The method according to claim 8, wherein the patient is undergoing a conditi n selected from the group consisting of cardioplegia, congestive heart failure, angioplasty, and a valve operation.

54. A method of treating dermatologic conditions, comprising topically administering a therapeutically effective amount of a pharmaceutically acceptable composition comprising the composition according to ~~claims 1, 2, 3, 4, 5, 6, or 7~~ claim 1 to a patient in need of such treatment.

55. The method according to claim 54, wherein the dermatological condition is wrinkling, or hair loss.

56. A method of treating wounds comprising administering an effective amount of the composition according to ~~claims 1, 2, 3, 4, 5, 6, or 7~~ claim 1.

57. The method according to claim 55, wherein the wounds are burn wounds.